NOT MEASUREMENT SENSITIVE

MIL-STD-2045-14500-2
16 March 1994

MILITARY STANDARD

Information Technology
DOD Standardized Transport Profile

TA21n(D) COTS OVER CLNS

Part 2: Balanced Point-to-Point Digital Data Circuit

AMSC: N/A AREA: DCPS

Foreword

This military standard is approved for use by all Departments and Agencies of the Department of Defense (DOD).

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this MIL-STD should be addressed to the:

Joint Interoperability and Engineering Organization (JIEO)
ATTN: TBBF
Fort Monmouth, New Jersey 07703-5613

by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this MIL-STD or by memorandum.

This DOD Standardized Profile (DSP) is a functional DOD Data Communications Protocol Standard (DCPS) produced by the DCPS Technical Management Panel (DTMP) Working Group 1 on Lower Layers. The MIL-STD-2045 document series was established within the DCPS Standardization Area to allow for the enhancement of commercial standards or the development of standards that are unique to DOD. DTMP functional standards are functional groupings of base standards. Referenced base standards may be commercial, DOD or de facto standards, although International Standards (produced by the International Standards Organization (ISO), the Inter-Telecommunication Union (ITU) (formerly known as the Consultative Committee for International Telephone & Telegraph (CCITT)), and other bodies) are preferred when possible.

The MIL-STD-2045-10000 series, MIL-STD-2045-10000 to MIL-STD-2045-19999 inclusive, will be used to describe how DOD will implement commercial, international, national, federal, or military standards within the functional profile concept to provide required network services. The Government Open Systems Interconnection Profiles (GOSIP) will serve as the base for developing the 10000 series with DOD enhancements, unique military standards, and interim standards being used only when necessary.

The MIL-STD-2045-20000 series, MIL-STD-2045-20000 to MIL-STD-2045-29999 inclusive, will be used to describe DOD enhancements and extensions to existing commercial, international, national, or federal standards.

The MIL-STD-2045-30000 series, MIL-STD-2045-30000 to MIL-STD-2045-39999 inclusive, will be used to describe protocols and services unique to DOD that will not be supported by commercial, international, national, or federal standards.

The MIL-STD-2045-40000 series, MIL-STD-2045-40000 to MIL-STD-2045-49999 inclusive, will be used to document interim standards. Interim standards document protocols and services needed by DOD until these protocols and services are described in either a GOSIP or a MIL-STD-2045-20000 or -30000 series standard.

Specific details and instructions for establishing a MIL-STD-2045 document, as well as profile development guidelines, are documented in MIL-HDBK-829. DTMP Working Groups shall be responsible for DSP development and informal Service or Agency coordination; the DTMP Plenary shall be responsible for final review and approval.

This document was produced as an outgrowth of a requirement established for transmitting digital imagery and imagery-related products using the National Imagery Transmission Format Standard (NITFS) and is intended to be a generic connectionless transport profile with differing subnetwork technologies for end systems (ES) to communicate over DOD or commercial circuits.

This document is part of a set of DOD data communications protocol profiles and is intended to support the interoperability of DOD communication networks, ultimately including connectivity with the Defense Data Network (DDN).

The current technical content of this document has been derived wherever possible from ISO 4335, ISO 4335AM 4, ISO 3309, and ISO 7809. However, this document is based on DOD requirements; and differences between the content of this document and these base standards may exist. This document must be combined with ISO 4335, ISO 4335AM 4, ISO 3309, and ISO 7809 when used.

This part of MIL-STD-2045-14500 contains one normative annex and one informative annex:

Annex A (normative)	DSPICS REQUIREMENTS LIST (DPRL)
Annex B (informative)	CONCLUDING MATERIAL

For DOD acquisition purposes, where such differences exist, this DSP shall be the controlling document.

The Preparing Activity for this standard is the DTMP. The custodians for the document are identified in the Defense Standardization Program, "Standardization Directory (SD-1)," and are classified in the Federal Supply Classification (FSC) system under Data Communications Protocol Standards (DCPS). Additional information can be obtained from:

Joint Interoperability and Engineering Organization (JIEO)
ATTN: DTMP Chairman
Fort Monmouth, New Jersey 07703-5613

Contents

Annexes

Contents (Concluded)

Figures

Tables

Introduction

This DOD Standardized Profile (DSP) is defined within the context of functional standardization, in accordance with the principles specified by ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles," and MIL-HDBK-829. The context of functional standardization is one part of the overall field of Information Technology (IT) standardization activities - covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards to promote system interoperability and to provide a basis for the development of uniform, internationally recognized system tests.

One of the most important roles for a DSP is to serve as the basis for the development of recognized tests. DSPs also guide implementors in developing systems that fit the needs of the US Department of Defense (DOD). DSPs are produced not simply to `legitimize' a particular choice of base standards and options, but to promote real system interoperability. The development and widespread acceptance of tests based on this and other DSPs are crucial to the successful realization of this goal.

The base standards of this DSP are the Open Systems Interconnection (OSI) Reference Model for OSI Layer standards. The Layer standards are composed of the ISO, ITU, other international civil standards, or Federal Information Processing Standards (FIPS).

The purpose of this document is to describe the protocols required for a complete transport profile that specifies a connection-mode transport service over a connectionless mode network service operating over a subnetwork dependent service that provides a synchronous, asynchronous, half-duplex and full-duplex dedicated digital circuit. This transport profile is a multipart profile, of which this is Part 2. Part 2 identifies the subnetwork dependent part that specifies the requirements for a connection-mode operation which provides the Balanced Point-to-Point link requirements.

This DSP is intended to be GOSIP-compliant. Since GOSIP permits differing subnetwork technologies, the excursions from those subnetworks described in FIPS 146-1, or use of standards that are clearly an update in the series, are of no real consequence to GOSIP internetworking capabilities and only affect the particular subnetwork being employed. The internetworking and end system-to-end system (ES-ES) aspects are fully compliant.

Selections of options are a decision and choice left solely to the implementor based on operational necessity. Vendors shall implement the options chosen by the implementor.

This part of MIL-STD-2045-14500 contains one normative annex and one informative annex:

Annex A DSPICS Requirements List (DPRL) (Normative)
Annex B Concluding Material (Informative)

Information Technology - DOD Standardized Profile TA21n(D) - Part 2: Balanced Point-to-Point Digital Data Circuit

1 Scope

1.1 General

This part of MIL-STD-2045-14500 applies to end systems (ES) concerned with operating in the military Open Systems Environment (OSE). This part, along with 2045-14500-1, specifies a combination of layer protocols that collectively provide the connection-oriented Transport Service using the connectionless-mode Network Service operating over a subnetwork using a synchronous, asynchronous, full-duplex or half-duplex dedicated link.

1.2 Position Within the Taxonomy

This profile is classified as MIL-STD-2045-14500 in accordance with MIL-HDBK-829. This classification is equivalent to the DSP-TA21(D) in accordance with MIL-HDBK-829 and ISO TR 10000.

1.3 Scenario

This part of MIL-STD-2045-14500 specifies the provision of a balanced, direct, point-to-point data link circuit between two ES. The compatible ES must use the same subnetwork access method and may conform to an alternative DSP with the same lower layer options selected. An ES is only compatible if the sub-options (e.g., Transport Protocol (Class 4)) are compatible.

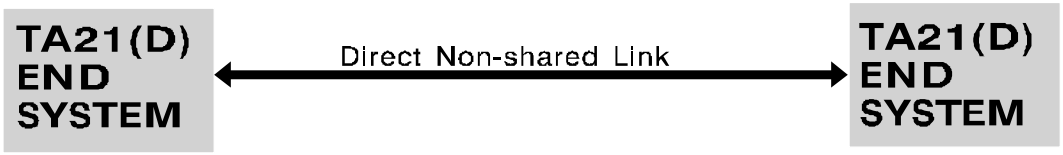

Figure 1 - Direct Point-to-Point Connection

The ISO layer standards that make up this profile are shown in Table 2. The shaded portion is contained in MIL-STD 2045-14500-1.

<table>
<tr><th rowspan="2">ISO LAYER</th><th rowspan="2">BASE STANDARDS</th><th colspan="2">TAXONOMY</th></tr>
<tr><th>ISO</th><th>DOD</th></tr>
<tr><td>TRANSPORT LAYER</td><td>ISO 8073</td><td rowspan="2">TA21</td><td rowspan="2">MIL-STD 2045-14500-1</td></tr>
<tr><td>NETWORK LAYER</td><td>ISO 8473</td></tr>
<tr><td>DATA LINK LAYER</td><td>ISO 7776/4335.2</td><td rowspan="2">TA21n

LAPB-based Subnetwork Access</td><td rowspan="2">MIL-STD 2045-14500-2</td></tr>
<tr><td>PHYSICAL LAYER</td><td>EIA 232-D/EIA 530</td></tr>
</table>

Table 2 - Protocol Stack for MIL-STD-2045-14500-2

The data link layer standards are mandated; and the physical layer standards are recommended, not mandated. This DSP does not specify the required functions for relays or the required function for operations in unreliable modes such as the simplex mode which is out of scope.

2 References

The following documents contain specific provisions which, through reference and selection in this text, constitute the required operational conditions for this DSP. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this DSP are warned against automatically applying any more recent editions of the documents listed below, since the references made by DSPs to such documents may be specific to a particular edition. The standards referenced by a base standard apply to the DSP only to the extent that they apply to that base standard and to the extent that the DSP allows.

2.1 Government Documents

2.1.1 Specifications, Standards, and Handbooks

The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Federal Information Processing Standards (FIPS):

FIPS 146-1:1991: *Government Open Systems Interconnection Profile (GOSIP), Version 2.*

Military Handbooks (MIL-HDBKs):

MIL-HDBK-829: *Guidelines for Developing Data Communications Protocol Standards (MIL-STD 2045 Series Documentation*).

DOD activities may obtain copies of DOD directives through their own publications channels or from the DOD Single Stock Point, Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Other federal agencies and the public may purchase copies from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171. Copies of FIPS are

available to DOD activities from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. Others must request copies of FIPS from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.

2.1.2 Other Government Documents, Drawings, and Publications

The following other government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

NIST SP-500-206: *Stable Implementation Agreements for Open Systems Interconnection Protocols Version 6 Edition 1.*

2.2 Non-Government Documents

The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD-adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

2.2.1 Profiles

ISP 10608-1: *Information Technology - International Standardized Profile TAnnnn - Connection-mode Transport Service over Connectionless-mode Network Service. 1992-04-30 Part 1: General Overview and Subnetwork-type Independent Requirements.*

(Application for copies of these documents should be addressed to the American Standards Institute, 11 West 42nd Street, New York, NY 10036 or to ISO, Van Demonstrate 94, 1013 CN Amsterdam, Netherlands.)

2.2.2 Base Standards

DIS 4335.2:1990: *Information Technology - Telecommunications and Information Exchange between Systems - High-Level Data Link Control (HDLC) Procedures - Elements of Procedures*.

ISO 7776:1993: *Information Technology - Data Communication - High Level Data Link Control Procedures - Description of the X.25 LAPB-compatible DTE Data Link Procedure.*

EIA 232-D:1987: *EIA 232-D, Interface Between Data Terminal Equipment and Data Circuit-Termination Equipment Employing Serial Binary Data Interchange.*

EIA 530:1992: *EIA 530, Interface Between Data Terminal Equipment and Data Circuit-Termination Equipment Employing Serial Binary Data Interchange.*

2.2.3 Other Non-Government Documents, Drawings, and Publications

The following other non-government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ISO 3309:1991: *Information Technology - Telecommunications and Information Exchange Between Systems - High Level Data Link Control (HDLC) Procedure - Frame Structure.*

ISO 4335:1991/DAM 4: *Information Technology - Telecommunications and Information Exchange between Systems -High-Level Data Link Control (HDLC) Procedures - Elements of Procedures - Amendment 4: Multi-Selective Reject Option*.

ISO 7776:1986/PAM 2:1992: *Information Processing Systems - Data Communication - High-Level Data Link Control Procedures - Description of the X.25 LAPB-compatible DTE Data Link Procedures -*

Amendment 2: Procedures For Multi-Selective Reject Option.

CCITT V.10: *Electrical characteristics for unbalanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications.*

CCITT V.11: *Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment in the field of data communications.*

CCITT X.21:1988: *Interface Between Data Terminal Equipment (DTE) and Data Circuit-Termination Equipment (DCE) for Synchronous Operation on Public Data Network*

ISO 7498:1984: *Information Processing Systems - Open Systems Interconnection - Basic Reference Model.*

ISO TR 10000: *Information Technology - Framework and Taxonomy of International Standardized Profiles.*

ISO 9542:1988: *Information Processing Systems - Telecommunications and Information exchange between systems -End system to Intermediate System routing exchange protocol for use in conjunction with the Protocol for providing the Connectionless Mode network service.*

(Application for copies of these documents should be addressed to the American Standards Institute, 11 West 42nd Street, New York, NY 10036 or to ISO, Van Demonstrate 94, 1013 CN Amsterdam, Netherlands.)

3 Definitions

For the purposes of this DSP, the following terms have the meanings stated in DSP Guidelines:

Base Standard
DOD Protocol Implementation Conformance Statement (DPICS)
DOD Standardized Profile (DSP)
DOD Standardized Profile Implementation Conformance Statement (DSPICS)
DSPICS Requirements List (DPRL)

4 Abbreviations and Acronyms

The symbols and abbreviations used in this DSP are defined in MIL-HDBK-829, in the referenced base standards, or in the standards referenced by the base standards.

ABM	Asynchronous Balanced Mode
ADM	Asynchronous Disconnect Mode
ASE	Application Service Element
CCITT	The International Telegraph and Telephone Consultative Committee
CL	Connectionless
CLNS	Connectionless Network Servic e
CLTS	Connectionless Transport Service
CO	Connection-oriented (or Connection Mode)
CONS	Connection-oriented Network Service
COTS	Connection-oriented Transport Service
DCE	Data Circuit-Terminating Equipment
DCPS	Data Communications Protocol Standards
DDN	Defense Data Network
DIS	Draft International Standard
DISA	Defense Information Systems Agency
DISC	Disconnect
DL	Data Link
DM	Disconnect Mode
DOD	Department of Defense
DODISS	DOD Index of Specifications and Standards
DSP	DOD Standardized Profile

DTE	Data Terminal Equipment
DTMP	DCPS Technical Management Panel
EIA	Electronics Industries Association
ER	Error Report
ES	End System
ES-ES	End System-to-End System
FCS	Frame Check Sequence
FEC	Forward Error Correction
FIPS	Federal Information Processing Standard
FRMR	Frame Reject
FSC	Federal Supply Classification
GNMP	Government Network Management Profile
GOSIP	Government Open Systems Interconnection Profile
IEC	International Electrotechnical Commission
IGOSS	Industry/Government Open Systems Specification
IPRL	ISPICS Requirements List
IS	International Standard
ISO	International Organization for Standardization; International Standards Organization
ISO-TR	ISO Technical Report
ISP	International Standardized Profile
ISPICS	ISP Information Conformance Statement
IT	Information Technology
ITU	Inter-Telecommunication Union
JIEO	Joint Interoperability and Engineering Organization
Kbps	Kilo bits per second
Mbps	Mega bits per second
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
NCMS	Network Connection Management Subprotocol
NDM	Normal Disconnect Mode
NIMP	NATO Interoperability Management Plan
NIST	National Institute of Standards and Technology
NIST-SP	NIST Special Publication
NITF	National Imagery Transmission Format
NITFS	NITF Standard
NLSP	Network Layer Security Protocol
NPDU	Network Protocol Data Unit
NS	Network Service
NSAP	Network Service Access Point
NSDU	Network Service Data Unit
OSE	Open Systems Environment
OSI	Open Systems Interconnection
PDAM	Proposed Draft Amendment (ISO)
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
QOS	Quality of Service
RD	Request Disconnect
REJ	Reject
RIM	Request Initialization Mode
RNR	Receive Not Ready
ROA	Request of Acknowledgement Mark
RR	Receiver Ready
RSET	Reset
SABM	Set Asynchronous Balanced Mode
SABME	Set Asynchronous Balanced Mode Extended
SATCOM	Satellite Communication
SD-1	Standardization Directory 1
SIA	Stable Implementors' Agreement
SIM	Set Initialization Mode

SN	SubNetwork
SNDCF	Subnetwork Dependent Convergence Function
SREJ	Selective Reject
STANAG	NATO Standardization Agreement
TAnnnn	Subnetwork Independent COTS over CLNS Profile
TC	Transport Connection
TCS	Trusted Communication Sublayer
TIS	Technical Interface Specification
TLSP	Transport Layer Security Protocol
TP4	Transport Protocol Class 4
TPDU	Transport Protocol Data Unit
TS	Transport Service
TSAP	Transport Service Access Point
UA	Unnumbered Acknowledgement Frame
UAnnnn	Subnetwork Independent CLTS over CLNS Profile
UI	Unnumbered Information Frame
UP	Unnumbered Poll Frame
XID	Exchange Identification Frame

5 Requirements

5.1 General Requirements

Part of this DSP is based on ISO/IEC International Standardized Profile (ISP) 10608-1:1992. The DSP additions to the ISP are detailed in this section. These additions include support of DOD specific requirements and the specifications set forth in the Stable Implementors' Agreements (SIA) and FIPS 146-1 (GOSIP).

A conforming implementation to this part of MIL-STD-2045-14500 shall satisfy:

- All requirements in the remainder of this section 5
- All mandatory requirements of the base standards referenced by this DSP
- All the constraints specified in Annex A (normative), DPRL.

5.2 Transport Layer Conformance Requirements

The Transport and Network Layer requirements are defined in MIL-STD-2045-14500-1.

5.3 Network Layer Conformance Requirements

The Network Layer requirements are defined in MIL-STD-2045-14500-1.

5.4 Data Link Conformance Requirements

A conforming implementation to this part of MIL-STD-2045-14500 shall satisfy the conformance requirements of ISO/IEC DIS 7776 and IS 7776/PAM 2.

5.4.1 Static Conformance Requirements

This section contains a defined set of services and performing functions of the High Level Data Link Control (HDLC)-Link Access Procedures Balanced (LAPB), ISO/IEC DIS 7776. This set of services and functions is further enhanced by multi-selective reject option, IS 7776/PAM 2.

5.4.1.1 Major Capabilities

5.4.1.1.1 The implementation shall support the single link procedure. Multi-link procedure shall be excluded. The Unbalanced Link case is covered in Part 3 of this DSP (Part 3 is a separate document).

5.4.1.1.2 The LAPB protocol shall be used to support both DTE/DCE and DTE/DTE operation. Address assignment information shall be defined as follows:

(a) DTE = Address A (=11000000);

(b) DCE = Address B (=10000000);

(c) On a DTE/DTE interface, one of the DTEs, by a prior agreement, shall use the DCE address.

5.4.1.2 Basic Operations

5.4.1.2.1 The LAPB protocol shall operate with either synchronous transmission or start/stop (asynchronous) transmission, but not both.

5.4.1.2.2 A station shall support both modulo 8 frame formats for basic operation and modulo 128 frame formats for extended operation.

5.4.1.3 Information Transfer

5.4.1.3.1 A station shall be capable of initiating checkpoint recovery by transmitting "I" frames with the Poll (P) bit set to 1.

5.4.1.4.1 A station shall support reception and correctly interpret SREJ frames.

5.4.1.4 Framing

5.4.1.4.1 A station shall send only octet aligned frames. Receipt of non-octet aligned frames shall be considered invalid and discarded.

5.4.1.4.2 The flag sequence shall consist of the binary sequence 01111110. A flag that terminates one frame may be used to signal the start of next frame.

5.4.1.2.3 For synchronous transmission, a frame shall be aborted by transmitting at least 7 contiguous 1 bits. For start/stop (asynchronous) transmission, a frame shall be aborted by transmitting the two-octet sequence "control escape - closing flag."

5.4.1.5 Timers

T1 timer recovery shall be supported upon transmission of REJ and SREJ frames.

5.4.2 Dynamic Conformance Requirements

A station, upon receipt of any out-of-sequence I frames, shall initiate either REJ recovery or SREJ recovery, but not both.

5.5 Physical Layer Recommendations

A conforming implementation to this part of MIL-STD-2045-14500 shall satisfy the performance requirements of EIA 232-D or EIA 530. The Physical Layer interface is not mandated, only recommended as is done in GOSIP. However, if the Physical Layer Interface selected is EIA 232-D or EIA 530, the performance requirements specified in this profile shall pertain.

Prior to January 1987, the EIA 232-D was named RS-232-C. The D version brings the specification in line with CCITT V.24, V.28 and ISO 2110. This version includes the addition of local loopback, remote loopback, and test

mode interchange circuits. Protective ground has been redefined, and a shield has been added. EIA 232-D is used for the data transmission range of 0-20 Kbps over distances up to 50 feet.

EIA 530 accommodates data transmission rates from 20 Kbps to 2 Mbps and for very short distances up to 10 Mbps. EIA 530 is compatible with CCITT V.10, V.11, X.26 and MIL-STD-188-114.

5.5.1 Static Conformance Requirements

Changes in the static conformance requirements for EIA 232-D and EIA 530 will be reflected in footnotes pertinent to the function as appearing in the PICS.

5.5.2 Dynamic Conformance Requirements

Changes in the dynamic conformance requirements for EIA 232-D and EIA 530 will be reflected in footnotes pertinent to the function as appearing in the PICS.

ANNEX A

(normative)

DSPICS REQUIREMENTS LIST (DPRL)

A.1 Introduction

This document provides the DSPICS Requirements List (DPRL) for implementations of MIL-STD-2045-14500. The DSPICS for an implementation is generated by completing the DPRL in accordance with the instructions given below.

The DPRL is based on the base standard and its PICS proforma where existing. The proforma in this document are based on those accompanying the referenced base standards, or on the text clauses in the bases standards.

An implementation shall satisfy the mandatory conformance requirements of the base standards referenced in this profile.

An implementation's completed DPRL is called the DSPICS. The DSPICS states which capabilities and options of the protocol have been implemented. The following can use the DSPICS:

(a) the protocol implementor, as a checklist to reduce the risk of failure to conform to the standard through oversight.

(b) the supplier and acquirer or potential acquirer of the imple mentation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the standard DSPICS proforma.

(c) the user or potential user of the implementation, as a basis for initially checking the possibility of inter-working with another implementation (note that, while inter-working can never be guaranteed, failure to internetwork can often be predicted from incompatible DSPICSs).

(d) a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.1.1 Notation

The following notations and symbols from MIL-HDBK-829, which references ISO/IEC TR 10000-1 and -2, are used in the DPRL to indicate the status of features:

Status Symbols

m	-	mandatory
m.<n>	-	support of every item of the group labeled by the same numeral <n> required, but only one is active at a time
o	-	optional
o.<n>	-	optional, but support of at least one of the group of options labeled by the same numeral <n> is required
c	-	conditional
-	-	non-applicable (i.e., logically impossible in the scope of the profile)
x	-	excluded or prohibited
i	-	out of scope of profile (left as an implementation choice)

In addition, the symbol "•" is used to indicate an option whose status is not constrained by the profile (status in the base standard). The o.<n> notation is used to show a set of selectable options (i.e., one or more of the set must be implemented) with the same identifier <n>.

Two character combinations may be used for dynamic conformance requirements. In this case, the first character refers to the static (implementation) status, and the second refers to the dynamic (use); thus "mo" means "mandatory to be implemented, optional to be used."

Notations for Conditional Status

The following predicate notations are used:

<predicate>:: This notation introduces a group of items, all of which are conditional on <predicate>.

<predicate>: This notation introduces a single item which is conditional on <predicate>.

In each case, the predicate may identify a profile feature, or a Boolean combination of predicates. ("^" is the symbol for logical negation.)

<index>: This predicate symbol means that the status following it applies only when the DPICS states that the features identified by the index are supported. In the simplest case, <index> is the identifying tag of a single DPICS item. The symbol <index> also may be a Boolean expression composed of several indexes.

<index>:: When this group predicate is true, the associated clause should be completed.

Notations used in the Protocol Feature Column

<r> Symbol used to denote the receiving system.
<t> Symbol used to denote the transmitting system.

Support Column Symbols

The support of every item as claimed by the implementor is stated by circling the appropriate answer (Yes, No, or N/A) in the support column:

Yes Supported by the implementation.
No Not supported by the implementation.
N/A Not applicable.

Base standard requirements are shown using the equivalent notations in upper case (e.g., M, O, X).

A.1.2 Static Support

Mandatory: The element or feature shall be fully supported. An implementation shall be able to generate the element and/or receive the element and perform all associated relevant procedures as defined in the base standards. Where support for origination and reception are not distinguished (such as in a footnote, etc.), then both capabilities must be assumed.

Optional: An implementation is not required to support the element or feature. If support is claimed, the element shall be treated as if it were specified as mandatory support. If support for origination is not claimed, then the element is not generated. If support for reception is not claimed, the element is ignored.

Conditional: The element or feature shall be supported under the conditions specified in this DSP. If these conditions are met, the element shall be treated as if it were specified as mandatory support. If these conditions are not met, the element shall be treated as if it were specified as optionally supported, unless otherwise stated.

Out of Scope: The element is outside the scope of this part of the DSP.

Not Applicable: The element is not applicable in the particular context in which this classification is used.

A.1.3 Dynamic Support

Mandatory: The element shall always be present. An implementation shall ensure that the element is always generated or otherwise used, as appropriate.

Excluded: The element shall never be present. An implementation shall ensure that the element is never generated or otherwise used, as appropriate.

A.1.4 Footnotes

Footnotes to the proforma are indicated by superscript numerals. The footnote appears on the page of the first occurrence of the numeral. Subsequent occurrences of a numeral refer to the footnote of the first occurrence.

A.1.5 Instructions for Completing the DPRL

A DSP implementor shows the extent of compliance to a DSP by completing the DPRL; that is, compliance to all mandatory requirements and the options that are not supported are shown. The resulting completed DPRL is called a DSPICS. Where this profile refines the features of the base standards, the requirements expressed in this DPRL shall be applied (as indicated in DPRL items with no "Profile Support" column) to constrain the allowable responses in the base standard DPICS proforma. When this profile makes additional requirements, the "Profile Support" column for such DPRLs shall be completed. In this column, each response shall be selected either from the indicated set of responses, or it shall comprise one or more parameter values as requested. If a conditional requirement is inapplicable, use the Not Applicable (NA) choice. If a mandatory requirement is not satisfied, exception information must be supplied by entering a reference Xi, where i is a unique identifier, to an accompanying rationale for the noncompliance. When the profile requirement is expressed as a two-character combination (as defined in A.1.1 above), the response shall address each element of the requirement; e.g., for the requirement "mo," the possible compliant responses are "yy" or "yn."

A.2 Standards Referenced

This profile specifies the provision for a balanced point-to-point data. It uses the following standards:

ISO 7776	Data Link Layer Protocol
ISO 4335.2	High Level Data Link Control Elements of Procedures
EIA 232-D, EIA 530	Physical Layer Specifications (recommended)

A.3 DSPICS Requirements List

A.3.1 General Information

A.3.1.1 Implementation Identification

Supplier	
Contact point for queries about the profile	
Implementation name(s) and version(s)	
Date of statement	
Other information: machine name, operating system, system name	

A.3.1.2 Protocols

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
TP	Transport Protocol class 4	ISO 8073	1.3	5.2	m	Yes
NP	Connectionless-mode Network protocol	ISO 8473	1.3	5.3	m	Yes
LAPB	Link Access Procedures Balanced	ISO 7776	1.3	5.4	m	Yes
RS	EIA 232-D/EIA-530	EIA 232-D/EIA 530	1.3	5.5	o	Yes No

A.3.2 Data Link Layer

The Data Link layer DPRL **must be used with the PICS proforma for the base standard** (ISO/IEC DIS 7776:1993), since only those features refined in the profile are included.

A.3.2.1 Major Capabilities (A.5 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Ls	Single link procedure	1	M	5.4.1.1.1	m	Yes
Lm	Multi-link procedure	6	O	5.4.1.1.1	x	No
DTE/DCE or DTE/DTE Operation						
Lt	DTE/DTE Operation	1,5.1	O	5.4.1.1.2	m	Yes
If DTE/DCE operation is supported:						
Lta	assignment of 'A' and 'B' Addresses as though for a DCE	1,5.1	O	5.4.1.1.2	m	Yes

A.3.2.2 Single link procedure: basic/extended operation and transmission environments (A.6.1 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Frame Format:						
M8	Basic (Modulo 8)	1,3,4.1.1	O.1	5.4.1.2.2	m	Yes
M128	Extended (Modulo 128)	1,3,4.1.1	O.1		m	Yes
Tsy	Synchronous transmission	3.5.1, 3.8.1, 3.9.1, 3.10.1, 3.11.1	O.2	5.4.1.2.1	o.2	Yes No
Tss	Start/stop transmission (including control-escape transparency)	3.5.2, 3.5.2.2, 3.7.2, 3.8.2, 3.9.2, 3.10.2 3.11.2	O.2	5.4.1.2.1	o.2	Yes No

A.3.2.3 Single Link procedure: information transfer (A.6.3 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Support of Information Transfer						
Does the DTE support checkpoint recovery, initiated by transmitting?:		4.4.2.1				
ITCi	I frames with P=1.		O.5	5.4.1.3.1	m	Yes
ITCs	Supervisory frames with P=1.		O.5		o	Yes No
ITRJ	I frame retransmission on receipt of REJ frames	4.4.2.2, 5.4.6	M	5.4.1.3.2	m	Yes
ITSR	I frame retransmission on receipt of SREJ frames	IS 7776/ PAM 2	O	5.4.1.3.2	m	Yes
^IRRJ[1]	Initiation of REJ recovery on out-of-sequence I frames	4.4.2.2, 5.4.4	M	5.4.2.1	m:o.1	Yes No
^IRSR[1]	Initiation of SREJ with Multi-selective rejection recovery on out of sequence I frames	IS 7776/ PAM 2	O	5.4.1.1	m:o.1	Yes No

Note 1: If SREJ is implemented, then the REJ recovery mechanism is excluded. Either may be implemented, bit not both.

Note 2: If REJ is implemented, then the SREJ recovery mechanism is excluded. Either may be implemented, bit not both.

A.3.2.4 Single link procedures: frame formats (A.6.4 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
F1a	Is the DTE capable of sending non-octet aligned frames?	3.4	O	5.4.1.4.1	x	No
Does receipt of non-octet aligned frames cause:						
F1b	Discard of frame as invalid?	3.8, 5.4.3	O.2	5.4.1.4.1	m	Yes
F1c	Acceptance of frame as valid?	3.8, 5.4.3	O.2		x	No
F4	Does the DTE generate a single flag to be used as both the closing flag for one frame and the opening flag for the next?	3.1	O	5.4.1.4.2	m	Yes
FAa	Is frame abortion supported for transmitted frames?	3.9	O		o	Yes

A.3.2.5 Single link procedure: timers (A.6.5 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Does DTE support Timer T1 recovery for the following frames sent?:						
T1e	REJ	4.4.2.2	O	5.4.1.5.1	IRRJ:m	Yes No
T1h	SREJ	IS 7776/ PAM 2	O	5.4.2.1	IRSR:m	Yes No

A.3.3 DTE/DCE Physical Interface (recommended)

This section references EIA 232-D and EIA 530.

A.3.3.1 General

Item	Feature	Base standard		Profile		Support
		Reference	Status	Clause	Status	
Interface type:						
I1 I2	- EIA 232-D - EIA 530		O.1 O.1	5.5 5.5	o.1 o.1	Yes No Yes No
Subnetwork access type:						
SN1 SN2	- Leased/Dedicated line - Switched network service	1.6	O.2 O.2		o.2 o.2	Yes No Yes No
Physical Interface:						
PI1 PI2	- V-series - X.21 bis leased circuit service	V.32, V.36 X.21 bis § 5.2	SN1: M SN2: M		SN1:m SN2:m	Yes Yes
SR1 SR2	Data signalling rates: - From 0 to 20 Kbps - From 20 Kbps to 2 Mbps	1.3	I1:M I2:M		I1:m I2:m else x	Yes Yes[1]
Sy NSy	Type of data communication: - Synchronous - Non-synchronous	1.5	O.3 O.3		PI1:m PI2:m	Yes Yes
Electrical Characteristics:						
V28 V10 V11	- V.28 - V.10 - V.11	V.28 V.10 V.11	I1:M else I2:O.4 I2:O.4		I1:m else I2:o I2:m	Yes Yes No Yes
DB25	Connector - DB25	ISO 2110	M		m	Yes

A.3.3.2 Interchange Circuits for EIA 232-D [1]

The following are applicable if EIA 232-D is selected.

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Interchange Circuits				5.5		

Note 3: The EIA-422-A standard, "Electrical Characteristics of Balanced Voltage Digital Interface Circuits," which can be used with EIA-530, supports data rates up to 10 Mbps over short cable lengths. The exact distance/frequency tradeoff is contained in the EIA-422 specification. The electrical characteristics are V.11 (X.27), and are consistent with the V.24 Functional requirements as called out in this DSP's Physical Layer specifications.

Note 4: The CCITT V.24 equivalent assignment numbers are given in parentheses.

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
AA	pin 1 - Protective Ground (101)	5.4	O		m	Yes
BA	pin 2 - Transmitted Data (103)		M		m	Yes
BB	pin 3 - Received Data (104)		M		m	Yes
CA	pin 4 - Request to Send (105)		M		m	Yes
CB	pin 5 - Clear to Send (106)		M		m	Yes
CC	pin 6 - Data Set Ready (107)		M		m	Yes
AB	pin 7 - Signal Ground/Common Return (102)	5.5	M		m	Yes
CF	pin 8 - Received Line Signal Detector (109)		M		m	Yes
SCF	pin 12 - Secondary Received Line Signal Detector (122)	5	O		o	Yes No
SCB	pin 13 - Secondary Clear to Send (121)	5	O		o	Yes No
SBA	pin 14 - Secondary Transmitted Data (118)	5	O		o	Yes No
DB	pin 15 - Transmission Signal Element Timing, DCE (114)	5	Sy:M else:O		m	Yes No
SBB	pin 16 - Secondary Received Data (119)	5	O		o	Yes No
DD	pin 17 - Receiver Signal Element Timing, DCE source (115)	5	Sy:M		Sy:m else:o	Yes No
SCA	pin 19 - Secondary Request to Send (120)	5	O		o	Yes No
CD	pin 20 - Data Terminal Ready (108)	5	SN2:M else:O		SN2:m else:o	Yes No
CG	pin 21 - Signal Quality Detector (110)	5	O		o	Yes No
CE	pin 22 - Ring Indicator (125)	5	SN2:M else:O		SN2:m else:o	Yes No
CH/CI[1]	pin 23 - Data Signal Rate Selector (111)	5	O		o	Yes No
DA	pin 24 - Transmit Signal Element Timing, DTE source (113)	5	Sy:M		Sy:m else:o	Yes No
RD	pin 9,10 - Reserved for Data Set Testing	3.2.1	O		o	Yes No
RL	pin 21 - Remote Loopback (140)		O		o	Yes No
LL	pin 18 - Local Loopback		O		o	Yes No
TM	pin 25 - Test Mode		O		o	Yes No

Note 5: If SCF is not used, CI is assigned to pin 12

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
UN	pin 11 - Unassigned	3.2.2	O		o	Yes No

A.3.3.3 Interchange Circuits for EIA 530 [1]

The following are applicable if EIA 530 is selected.

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
	pin 1 - Shield		M		m	Yes
BA	pin 2 - Transmitted Data A (103) pin 14 - Transmitted Data B		M		m	Yes
BB	pin 3 - Received Data A (104) pin 16 - Received Data B		M		m	Yes
CA	pin 4 - Request to Send A (105) pin 19 - Request to Send B		M		m	Yes
CB	pin 5 - Clear to Send A (106) pin 13 - Clear to Send B		M		m	Yes
CC	pin 6 - Data Set Ready DCE A (107) pin 22 - Data Set Ready DCE B		M		m	Yes
CD	pin 20 - Data set Ready DTE A (108) pin 23 - Data set Ready DTE B		M		m	Yes
AB	pin 7 - Signal Ground/Common Return (102)		M		m	Yes
CF	pin 8 - Received Line Signal Detector A(109) pin 10 - Received Line Signal Detector B		M		m	Yes
DA	pin 24 - Transmit Signal Element Timing A,DTE (113) pin 11 - Transmit Signal Element Timing B,DTE		Sy:M else:O		Sy:m else:o	Yes
DB	pin 15 - Transmit Signal Element Timing A,DCE (114) pin 12 - Transmit Signal Element Timing B,DCE		Sy:M else:O		Sy:m else:o	Yes
DD	pin 17 - Receiver Signal Element Timing A, DCE source (115) pin 9 - Receiver Signal Element Timing B, DCE source		Sy:M else:O		Sy:m else:o	Yes
RL	pin 21 - Remote Loopback (140)		O		o	Yes No
LL	pin 18 - Local Loopback		O		o	Yes No
TM	pin 25 - Test Mode		O		o	Yes No

Note 6: The CCITT V.24 equivalent assignment numbers are given in parentheses.

ANNEX B

(informative)

CONCLUDING MATERIAL

B.1 Deviations from Base Standards/Referenced Profiles

There are no deviations from the base standards; however, the options chosen are not the standard LAP-B selections as is used in X.25. Each profile requires that a definitive selection of available options be made with respect to the desired implementation. At the Link Layer, there are 14 options that require selection or non-selection, and in some cases certain options will automatically preclude another option selection. The options chosen in this profile were selected as a result of Service and Agency requirements, NITF transmission requirements, GOSIP requirements, and finally to reflect what is already in 'field use' in many cases. This profile is a synthesis of all these parameters. The profile provides for selective reject of frames vice use of the prevalent Go-back-n procedure. SREJ permits a much higher throughput and is desirable for military tactical circuits. Additionally, synchronous and asynchronous transmission is defined and provided.

B.2 Subject Term (Key Word) Listing

Allied Communication Publication (ACP)
DOD Standardized Profile (DSP)
Data Communications Protocol Standards (DCPS)
DCPS Technical Management Panel (DTMP)
DSPICS Proforma
International Standardized Profile (ISP)
Unbalanced
ConnectionLess Transport Service (CLTS)
ConnectionLess Network Service (CLNS)
High Level Data Link Control (HDLC)
Open Systems Interconnection (OSI)
PICS Proforma

B.3 Preparing Activity

DISA-JIEO (Project DCPS-0008)

B.4 Reviewing Activities

Army	SC, PT
Air Force	13, 17, 29, 33, 90
DLA	DH
DMA	MP
DIA	DI
DOT	OST
OASD	IQ, DO, IR
ODISC4 AC	
NAVY	EC, CH, ND, TD, OM
USMC	MC, CG

B.5 Custodians

DISA:	DC
Army:	SC
Air Force:	90
Navy:	OM
DIA:	DI
NSA:	NS
USMC:	MC
DLA:	DH
Other:	Joint Staff/Architecture & Integration
	USSPACECOM

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1,2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER **MIL-STD-2045-14500-2**	2. DOCUMENT DATE *(YYMMDD)* 940316

3. DOCUMENT TITLE: DOD Standardized Transport Profile, TA21n(D) COTS over CLNS, Part 2: Balanced Point-to-Point Digital Circuit

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(If applicable)*	7. DATE SUBMITTED *(YYMMDD)*

8. PREPARING ACTIVITY

DEFENSE INFORMATION SYSTEMS AGENCY (DISA)

a. NAME	b. TELEPHONE *(Include Area Code)*
Rose D. Satz	(1) Commercial 908-532-7732 (2) DSN 992-7732
c. ADDRESS *(Include Zip Code)* ATTN: TBBF (Rose D. Satz) JIEO Ft Monmouth, NJ 07703-5613	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466

	Telephone (703) 756-2340	DSN 289-2340

DD Form 1426, OCT 89 *Previous editions are obsolete.* 198-290